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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/559,958
Filing Date: June 30, 2006
Appellant(s): MANZ ET AL.

Patrick F. Clunk
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 17, 2011, appealing from the Office action mailed July 13, 2010.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-12, 15-50, 53-81, and 84-99 are pending.

Claims 12, 14, 51, 52, 82, and 83 have been canceled.

Claims 1-12, 15-50, 53-81, and 84-99 are rejected and subject to appeal.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

Raymond et al., "Continuous Sample Pretreatment Using a Free-Flow Electrophoresis Device Integrated onto a Silicon Chip", Analytical Chemistry, vol. 55, no. 18 (Sept. 15, 1994), pp. 2858-2865

2003/0159999	OAKEY et al.	8-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-12, 15-50, 53-81, and 84-99 are rejected under 35 U.S.C. 103(a) as being unpatentable over an article by RAYMOND et al. (“Continuous Sample Pretreatment Using a Free-Flow Electrophoresis Device Integrated onto a Silicon Chip”, ANALYTICAL CHEMISTRY, vol. 66, September 15, 1994, p. 2858-2865) in view of OAKEY et al. (US 2003/0159999 A1).

Regarding claim 1, RAYMOND teaches a free flow electrophoresis microchip, comprising:

a separation chamber comprising a planar chamber (Figure 3) having a planar region (separation bed, Figure 3), in which charged components are in use separated (separation bed, Figure 3);

a plurality of separation medium inlet channels having outlets fluidly connected to one inlet side of the separation chamber (1 and 2, Figure 2; left carrier inlet and right carrier inlet, Figure 3) through which flows of a separation medium are in use introduced into the separation chamber such as to develop a laminar flow (second paragraph, Silicon Device section, p. 2860) having a flow direction through the separation chamber (carrier flow indication, Figure 1);

a sample inlet channel having an outlet fluidly connected to the inlet side of the separation chamber (3, Figure 2; sample inlet, Figure 3) through which a flow of sample containing charged components is in use introduced into the separation chamber (first paragraph, Amino Acid Separation section, p. 2863; Figure 1); and

whereby charged components introduced into the separation chamber are deflected laterally across the separation chamber in dependence upon the charge of the charged components (Figure 1).

RAYMOND suggests a plurality of outlet channels having inlets fluidly connected to another outlet side of the separation chamber opposite the inlet side thereof (second paragraph, Silicon Device section, p. 2860), although this design was not utilized in the described invention to simplify fabrication of the initial device.

RAYMOND doe not teach a magnetic field unit.

However, OAKEY discloses a microfluidic device, wherein is taught a magnetic field unit for providing a magnetic field substantially orthogonal, wherein

the magnetic field is directed substantially orthogonally to a planar region of a microchannel (44 and 92, Figure 3), to the flow direction of a separation medium in a microfluidic format (92, Figure 3; paragraph [0058]).

At the time of the present invention, it would have been obvious to one of ordinary skill in the art to modify the device as described by RAYMOND with the addition of the magnetic field unit as taught by OAKEY because it would allow use of surface charge to be observed for distinguishing a particular particle in a sample (OAKEY, paragraph [0047]).

Regarding claim 2, RAYMOND teaches outlets of the separation medium inlet channels are disposed in a spaced relation along the inlet side of the separation chamber (Figure 3).

Regarding claim 3, RAYMOND teaches the outlet of the sample inlet channel is disposed in a central region of the inlet side of the separation chamber (Figures 2 and 3).

Regarding claim 4, RAYMOND teaches the outlet of the sample inlet channel is disposed in an end region of the inlet side of the separation chamber (Figures 2 and 3).

Regarding claim 5, RAYMOND teaches the outlets of the sample inlet channel and the separation medium inlet channels face in the same direction (Figures 2 and 3).

Regarding claim 6, RAYMOND teaches the separation medium inlet channels are commonly fluidly connected (Figure 2).

Regarding claim 7, RAYMOND teaches groups of ones of the separation medium inlet channels are commonly fluidly connected (Figure 3).

Regarding claim 8, RAYMOND teaches the separation medium inlet channels are separately fluidly connected (Figure 3).

Regarding claim 9, RAYMOND teaches the outlets of the sample inlet channel and the separation medium inlet channels are disposed in opposed relation to the inlets of the outlet channels (Figure 2).

Regarding claim 10, RAYMOND suggests the inlets of the outlet channels have a depth at least as great as that of the separation chamber, in that the proposed outlet array is identical to the inlet channel array (second paragraph, Silicon Devices section, p. 2860) and the inlet channel array is shown to have a depth at least as great as that of the separation chamber (Figure 3).

Regarding claim 11, RAYMOND teaches the inlets of the outlet channels are disposed in a spaced relation along the outlet side of the separation chamber (Figure 2).

Regarding claim 12, RAYMOND teaches the inlets of the outlet channels are equally spaced (Figure 2).

Regarding claim 15, RAYMOND teaches the separation chamber has a depth of 50 µm (first paragraph, Silicon Devices section, p. 2859).

Regarding claims 16-18, RAYMOND, as modified by OAKEY in claim 1, teaches a magnetic field unit that is a field generator (OAKEY, paragraph [0058]). Neither RAYMOND nor OAKEY teach the magnetic field unit is a magnet in the form of a Ni-Fe permalloy magnet, which is a well-known magnetic material.

However, at the time of the present invention, it would have been obvious to one of ordinary skill in the art to substitute a known element in the field generator, as taught by OAKEY, as the magnetic field unit for another known element, a Ni-Fe permalloy magnet, with a predictable result (*KSR International Co. v. Teleflex Inc., 550 U.S.__, 82 USPQ2d 1385 (2007)*).

Regarding claim 19, RAYMOND teaches the microchip further comprising:

a first and second electrode unit (third paragraph, Silicon Devices section, p. 2860) disposed at respective ones of other lateral sides of the separation chamber (8 and 9, Figure 2).

Regarding claim 20, RAYMOND teaches the electrode units each comprise an electrolyte reservoir disposed adjacent the respective lateral side of the separation chamber (8 and 9, Figure 2; side beds, Figure 3) for containing a volume of an electrolyte medium, by virtue of having their own inlets (4 and 5, Figure 2) and outlets (6 and 7, Figure 2), and a plurality of connection channels fluidly connecting the electrolyte reservoir to the respective lateral side of the separation channel (side channel arrays, Figure 3).

Regarding claim 21, RAYMOND teaches each electrolyte reservoir has substantially the same length as the separation chamber (Figure 2).

Regarding claim 22, RAYMOND teaches the connection channels are disposed in a spaced relation along the respective lateral sides of the separation channel (Figure 3).

Regarding claim 23, RAYMOND teaches the connection channels are equally spaced (Figure 3).

Regarding claim 24, RAYMOND teaches the connection channels are 12 µm wide (first paragraph, Silicon Devices section, p. 2859-2860). RAYMOND does not explicitly teach the connection channels have a width from about 1 µm to about 5 µm. However, it has been held where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (*Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984)). Therefore, it would be obvious to one of skill in the art, given the width taught by RAYMOND to utilize a width in the range from about 1 µm to about 5 µm as it is merely a simple change in dimension that would not perform a different function as the width explicitly taught by RAYMOND.

Regarding claim 25, RAYMOND teaches the electrode unit each further comprises an electrode element disposed in the respective electrolyte reservoir (third paragraph, Silicon Devices section, p. 2860).

Regarding claim 26, RAYMOND, as modified by OAKEY, teaches all the limitations of claims 1 and 19 for a free flow electrophoresis microchip, as outlined above. Additionally, RAYMOND teaches a high-voltage supply for applying an electric field between the electrode units and across the separation

chamber (last two sentences, Equipment and Data Acquisition section, p. 2860) in a direction that would substantially orthogonal to the magnetic field as taught by OAKEY (RAYMOND, Figure 1). The combination of the electric field and magnetic field would inherently yield a magnetohydrodynamic flow of sample and separation medium in the separation chamber.

Regarding claim 27, RAYMOND, as modified by OAKEY, teaches all the limitations of claims 1 and 19 for a free flow electrophoresis microchip, as outlined above. Additionally, RAYMOND teaches a supply unit for supplying flows of sample and separation medium through the respective ones of the sample inlet channel and the separation medium inlet channels and into the separation chamber (fifth sentence, Equipment and Data Acquisition section, p. 2860); whereby an electric field is induced across the separation chamber in a direction substantially orthogonal to the flow direction (Figure 1).

Regarding claim 28, RAYMOND teaches the supply unit comprises a first transfer unit, in the form of external fluid lines (second paragraph, Silicon Devices section, p. 2860) and syringe pumps (Equipment and Data Acquisition section, p. 2860), connected to the sample inlet channel for delivering a flow of sample through the sample inlet channel and into the separation chamber (as demonstrated in a measurable sample flow rate, Figure 6 caption), and at least one second transfer unit, in the form of external fluid lines (second paragraph,

Silicon Devices section, p. 2860) and syringe pumps (Equipment and Data Acquisition section, p. 2860), fluidly connected to the separation medium inlet channels for delivering flows of separation medium through the separation medium inlet channels and into the separation chamber (as demonstrated in a measurable carrier buffer flow rate, Figure 6 caption).

Regarding claim 29, RAYMOND teaches both the first and second transfer units are operable to control flow rate of the sample and separation medium flows to the separation chamber (Figure 6 caption).

Regarding claim 30, RAYMOND does not explicitly teach the at least one second transfer unit comprises a plurality of second transfer units fluidly connected to respective ones of the separation medium inlet channels. However, RAYMOND teaches that the second transfer unit is fluidly connected to at least one of the separation medium inlet channels (as demonstrated in a measurable carrier buffer flow rate, Figure 6 caption), and it has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced (*In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960)).

Regarding claims 31 and 32, the teachings of RAYMOND and holdings of precedent make the limitations of claim 30 obvious. It would be obvious to one of

ordinary skill in the art that the plurality of second transfer units, in the form of external fluid lines (second paragraph, Silicon Devices section, p. 2860) and syringe pumps (Equipment and Data Acquisition section, p. 2860), could either be fluidly connected to groups of ones of the separation medium inlet channels or fluidly connected to separate ones of the separation medium inlet channels as a matter of design choice that would not impact the overall performance of the described device.

Regarding claim 33, RAYMOND teaches each transfer unit comprises a delivery pump, in the form of syringe pumps (Equipment and Data Acquisition section, p. 2860).

Regarding claims 34 and 35, RAYMOND suggested a plurality of collection units fluidly connected to respective ones of the outlet channels for collection of a plurality of separated components, suggesting a fraction collector (second paragraph, Silicon Devices section, p. 2860).

Regarding claim 36, RAYMOND teaches a detection unit (Detection System section, p. 2860) for detecting migration of at least one separated component through at least one of the outlet channels (inset Figure 8 and Figure 9).

Regarding claims 37 and 38, RAYMOND teaches that the detection system comprises a motorized X-Y translation stage that allows scanning across the separation bed width, at various locations along its length (Equipment and Data Acquisition section, p. 2860). This, coupled with the suggestion of RAYMOND for a fraction collector (second paragraph, Silicon Devices section, p. 2860) would have made it obvious to a skilled artisan to utilize the detection unit to detect migration of separated components through any or all of the outlet channels because ideally the separated components will reside in a particular outlet channel of the fraction collector.

Regarding claim 39, RAYMOND teaches a free flow electrophoresis method of separating charged components, the method comprising the steps of:

providing a free flow electrophoresis microchip, comprising:

a separation chamber comprising a planar chamber (Figure 3) having a planar region (separation bed, Figure 3), in which charged components are in use separated (separation bed, Figure 3);

a plurality of separation medium inlet channels having outlets fluidly connected to one inlet side of the separation chamber (1 and 2, Figure 2; left carrier inlet and right carrier inlet, Figure 3) through which flows of a separation medium are in use introduced into the separation chamber such as to develop a laminar flow (second paragraph, Silicon Device section, p. 2860) having a flow direction through the separation chamber (carrier flow indication, Figure 1);

a sample inlet channel having an outlet fluidly connected to the inlet side of the separation chamber (3, Figure 2; sample inlet, Figure 3) through which a flow of sample containing charged components is in use introduced into the separation chamber (first paragraph, Amino Acid Separation section, p. 2863; Figure 1); a first and second electrode units (third paragraph, Silicon Devices section, p. 2860) disposed at respective ones of other lateral sides of the separation chamber (8 and 9, Figure 2).

RAYMOND suggests a plurality of outlet channels having inlets fluidly connected to another outlet side of the separation chamber opposite the inlet side thereof (second paragraph, Silicon Device section, p. 2860), although this design was not utilized in the described invention to simplify fabrication of the initial device.

RAYMOND doe not teach a magnetic field unit.

However, OAKEY discloses a microfluidic device, wherein is taught a magnetic field unit for providing a magnetic field substantially orthogonal to the flow direction of a separation medium in a microfluidic format (92, Figure 3; paragraph [0058]), wherein the magnetic field is directed substantially orthogonally to a planar region of a microchannel (44 and 92, Figure 3).

At the time of the present invention, it would have been obvious to one of ordinary skill in the art to modify the device as described by RAYMOND with the addition of the magnetic field unit as taught by OAKEY because it would allow

use of surface charge to be observed for distinguishing a particular particle in a sample (OAKEY, paragraph [0047]).

RAYMOND also teaches applying a potential between the electrode units so as to generate an electric field across the separation chamber in a direction that would be substantially orthogonal to the magnetic field as taught by OAKEY (Figure 1). The combination of the electric field and magnetic field would inherently yield a magnetohydrodynamic flow of sample and separation medium in the separation chamber, and RAYMOND teaches defection of the charged components laterally across the separation chamber in dependence upon the charge of the charged components (Figure 1).

Regarding claim 40, RAYMOND teaches outlets of the separation medium inlet channels are disposed in a spaced relation along the inlet side of the separation chamber (Figure 3).

Regarding claim 41, RAYMOND teaches the outlet of the sample inlet channel is disposed in a central region of the inlet side of the separation chamber (Figures 2 and 3).

Regarding claim 42, RAYMOND teaches the outlet of the sample inlet channel is disposed in an end region of the inlet side of the separation chamber (Figures 2 and 3).

Regarding claim 43, RAYMOND teaches the outlets of the sample inlet channel and the separation medium inlet channels face in the same direction (Figures 2 and 3).

Regarding claim 44, RAYMOND teaches the separation medium inlet channels are commonly fluidly connected (Figure 2).

Regarding claim 45, RAYMOND teaches groups of ones of the separation medium inlet channels are commonly fluidly connected (Figure 3).

Regarding claim 46, RAYMOND teaches the separation medium inlet channels are separately fluidly connected (Figure 3).

Regarding claim 47, RAYMOND teaches the outlets of the sample inlet channel and the separation medium inlet channels are disposed in opposed relation to the inlets of the outlet channels (Figure 2).

Regarding claim 48, RAYMOND suggests the inlets of the outlet channels have a depth at least as great as that of the separation chamber, in that the proposed outlet array is identical to the inlet channel array (second paragraph, Silicon Devices section, p. 2860) and the inlet channel array is shown to have a depth at least as great as that of the separation chamber (Figure 3).

Regarding claim 49, RAYMOND teaches the inlets of the outlet channels are disposed in a spaced relation along the outlet side of the separation chamber (Figure 2).

Regarding claim 50, RAYMOND teaches the inlets of the outlet channels are equally spaced (Figure 2).

Regarding claim 53, RAYMOND teaches the separation chamber has a depth of 50 µm (first paragraph, Silicon Devices section, p. 2859).

Regarding claims 54-56, RAYMOND, as modified by OAKEY in claim 1, teaches a magnetic field unit that is a field generator (OAKEY, paragraph [0058]). Neither RAYMOND nor OAKEY teach the magnetic field unit is a magnet in the form of a Ni-Fe permalloy magnet, which is a well-known magnetic material.

However, at the time of the present invention, it would have been obvious to one of ordinary skill in the art to substitute a known element in the field generator, as taught by OAKEY, as the magnetic field unit for another known element, a Ni-Fe permalloy magnet, with a predictable result (*KSR International Co. v. Teleflex Inc., 550 U.S.__, 82 USPQ2d 1385 (2007)*).

Regarding claim 57, RAYMOND teaches the electrode units each comprise an electrolyte reservoir disposed adjacent the respective lateral side of

the separation chamber (8 and 9, Figure 2; side beds, Figure 3) for containing a volume of an electrolyte medium, by virtue of having their own inlets (4 and 5, Figure 2) and outlets (6 and 7, Figure 2), and a plurality of connection channels fluidly connecting the electrolyte reservoir to the respective lateral side of the separation channel (side channel arrays, Figure 3).

Regarding claim 58, RAYMOND teaches each electrolyte reservoir has substantially the same length as the separation chamber (Figure 2).

Regarding claim 59, RAYMOND teaches the connection channels are disposed in a spaced relation along the respective lateral sides of the separation channel (Figure 3).

Regarding claim 60, RAYMOND teaches the connection channels are equally spaced (Figure 3).

Regarding claim 61, RAYMOND teaches the connection channels are 12 µm wide (first paragraph, Silicon Devices section, p. 2859-2860). RAYMOND does not explicitly teach the connection channels have a width from about 1 µm to about 5 µm. However, it has been held where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform

differently than the prior art device, the claimed device was not patentably distinct from the prior art device (*Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984)). Therefore, it would be obvious to one of skill in the art, given the width taught by RAYMOND to utilize a width in the range from about 1 µm to about 5 µm as it is merely a simple change in dimension that would not perform a different function as the width explicitly taught by RAYMOND.

Regarding claim 62, RAYMOND teaches the electrode unit each further comprises an electrode element disposed in the respective electrolyte reservoir (third paragraph, Silicon Devices section, p. 2860).

Regarding claims 63 and 64, RAYMOND suggested a plurality of collection units fluidly connected to respective ones of the outlet channels for collection of a plurality of separated components, suggesting a fraction collector (second paragraph, Silicon Devices section, p. 2860).

Regarding claim 65, RAYMOND teaches a detection unit (Detection System section, p. 2860) for detecting migration of at least one separated component through at least one of the outlet channels (inset Figure 8 and Figure 9).

Regarding claims 66 and 67, RAYMOND teaches that the detection system comprises a motorized X-Y translation stage that allows scanning across the separation bed width, at various locations along its length (Equipment and Data Acquisition section, p. 2860). This, coupled with the suggestion of RAYMOND for a fraction collector (second paragraph, Silicon Devices section, p. 2860) would have made it obvious to a skilled artisan to utilize the detection unit to detect migration of separated components through any or all of the outlet channels because ideally the separated components will reside in a particular outlet channel of the fraction collector.

Regarding claim 68, RAYMOND teaches a free flow electrophoresis method of separating charged components, the method comprising the steps of:

providing a free flow electrophoresis microchip, comprising:

a separation chamber comprising a planar chamber (Figure 3) having a planar region (separation bed, Figure 3), in which charged components are in use separated (separation bed, Figure 3);

a plurality of separation medium inlet channels having outlets fluidly connected to one inlet side of the separation chamber (1 and 2, Figure 2; left carrier inlet and right carrier inlet, Figure 3) through which flows of a separation medium are in use introduced into the separation chamber such as to develop a laminar flow (second paragraph, Silicon Device section, p. 2860) having a flow direction through the separation chamber (carrier flow indication, Figure 1);

a sample inlet channel having an outlet fluidly connected to the inlet side of the separation chamber (3, Figure 2; sample inlet, Figure 3) through which a flow of sample containing charged components is in use introduced into the separation chamber (first paragraph, Amino Acid Separation section, p. 2863; Figure 1); and

RAYMOND suggests a plurality of outlet channels having inlets fluidly connected to another outlet side of the separation chamber opposite the inlet side thereof (second paragraph, Silicon Device section, p. 2860), although this design was not utilized in the described invention to simplify fabrication of the initial device.

RAYMOND doe not teach a magnetic field unit.

However, OAKEY discloses a microfluidic device, wherein is taught a magnetic field unit for providing a magnetic field substantially orthogonal to the flow direction of a separation medium in a microfluidic format (92, Figure 3; paragraph [0058]), wherein the magnetic field is directed substantially orthogonally to a planar region of a microchannel (44 and 92, Figure 3).

At the time of the present invention, it would have been obvious to one of ordinary skill in the art to modify the device as described by RAYMOND with the addition of the magnetic field unit as taught by OAKEY because it would allow use of surface charge to be observed for distinguishing a particular particle in a sample (OAKEY, paragraph [0047]).

RAYMOND also teaches supplying flows of sample and separation medium through the respective ones of the sample inlet channel and the separation medium inlet channels and into the separation chamber (fifth sentence, Equipment and Data Acquisition section, p. 2860), wherein the flow of separation medium would inherently act with the magnetic field as taught by OAKEY to induce an electric field across the separation chamber in a direction substantially orthogonal to the flow direction, where the inherent phenomena would act to deflect the charged components laterally across the separation chamber in dependence upon the charge of the charged components.

Regarding claim 69, RAYMOND teaches outlets of the separation medium inlet channels are disposed in a spaced relation along the inlet side of the separation chamber (Figure 3).

Regarding claim 70, RAYMOND teaches the outlet of the sample inlet channel is disposed in a central region of the inlet side of the separation chamber (Figures 2 and 3).

Regarding claim 71, RAYMOND teaches the outlet of the sample inlet channel is disposed in an end region of the inlet side of the separation chamber (Figures 2 and 3).

Regarding claim 72, RAYMOND teaches the outlets of the sample inlet channel and the separation medium inlet channels face in the same direction (Figures 2 and 3).

Regarding claim 73, RAYMOND teaches the separation medium inlet channels are commonly fluidly connected (Figure 2).

Regarding claim 74, RAYMOND teaches groups of ones of the separation medium inlet channels are commonly fluidly connected (Figure 3).

Regarding claim 75, RAYMOND teaches the separation medium inlet channels are separately fluidly connected (Figure 3).

Regarding claim 76, RAYMOND teaches that the supplying sample and separation medium comprises the step of:

delivering sample and separation medium flow through the respective ones of sample inlet channel and separation medium inlet channels and into the separation chamber (as indicated by Sample Inlet and Carrier Flow, Figure 1).

Regarding claim 77, RAYMOND teaches the flow rates of the sample and separation medium are regulated (Figure caption 6 and Figure 7), which affects the residence time of the sample in the separation chamber, which will in turn

determine the length of time the sample is subject to the fields and this will control the lateral deflection of the sample charged components.

Regarding claim 78, RAYMOND teaches the outlets of the sample inlet channel and the separation medium inlet channels are disposed in opposed relation to the inlets of the outlet channels (Figure 2).

Regarding claim 79, RAYMOND suggests the inlets of the outlet channels have a depth at least as great as that of the separation chamber, in that the proposed outlet array is identical to the inlet channel array (second paragraph, Silicon Devices section, p. 2860) and the inlet channel array is shown to have a depth at least as great as that of the separation chamber (Figure 3).

Regarding claim 80, RAYMOND teaches the inlets of the outlet channels are disposed in a spaced relation along the outlet side of the separation chamber (Figure 2).

Regarding claim 81, RAYMOND teaches the inlets of the outlet channels are equally spaced (Figure 2).

Regarding claim 84, RAYMOND teaches the separation chamber has a depth of 50 µm (first paragraph, Silicon Devices section, p. 2859).

Regarding claims 85-87, RAYMOND, as modified by OAKEY in claim 1, teaches a magnetic field unit that is a field generator (OAKEY, paragraph [0058]). Neither RAYMOND nor OAKEY teach the magnetic field unit is a magnet in the form of a Ni-Fe permalloy magnet, which is a well-known magnetic material.

However, at the time of the present invention, it would have been obvious to one of ordinary skill in the art to substitute a known element in the field generator, as taught by OAKEY, as the magnetic field unit for another known element, a Ni-Fe permalloy magnet, with a predictable result (*KSR International Co. v. Teleflex Inc., 550 U.S.__, 82 USPQ2d 1385 (2007)*).

Regarding claim 88, RAYMOND teaches the microchip further comprising:

first and second electrode units (third paragraph, Silicon Devices section, p. 2860) disposed at respective ones of other lateral sides of the separation chamber (8 and 9, Figure 2).

Regarding claim 89, RAYMOND teaches the electrode units each comprise an electrolyte reservoir disposed adjacent the respective lateral side of the separation chamber (8 and 9, Figure 2; side beds, Figure 3) for containing a volume of an electrolyte medium, by virtue of having their own inlets (4 and 5, Figure 2) and outlets (6 and 7, Figure 2), and a plurality of connection channels

fluidly connecting the electrolyte reservoir to the respective lateral side of the separation channel (side channel arrays, Figure 3).

Regarding claim 90, RAYMOND teaches each electrolyte reservoir has substantially the same length as the separation chamber (Figure 2).

Regarding claim 91, RAYMOND teaches the connection channels are disposed in a spaced relation along the respective lateral sides of the separation channel (Figure 3).

Regarding claim 92, RAYMOND teaches the connection channels are equally spaced (Figure 3).

Regarding claim 93, RAYMOND teaches the connection channels are 12 µm wide (first paragraph, Silicon Devices section, p. 2859-2860). RAYMOND does not explicitly teach the connection channels have a width from about 1 µm to about 5 µm. However, it has been held where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (*Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984)).

Therefore, it would be obvious to one of skill in the art, given the width taught by RAYMOND to utilize a width in the range from about 1 µm to about 5 µm as it is merely a simple change in dimension that would not perform a different function as the width explicitly taught by RAYMOND.

Regarding claim 94, RAYMOND teaches the electrode unit each further comprises an electrode element disposed in the respective electrolyte reservoir (third paragraph, Silicon Devices section, p. 2860).

Regarding claims 95 and 96, RAYMOND suggested a plurality of collection units fluidly connected to respective ones of the outlet channels for collection of a plurality of separated components, suggesting a fraction collector (second paragraph, Silicon Devices section, p. 2860).

Regarding claim 97, RAYMOND teaches a detection unit (Detection System section, p. 2860) for detecting migration of at least one separated component through at least one of the outlet channels (inset Figure 8 and Figure 9).

Regarding claims 98 and 99, RAYMOND teaches that the detection system comprises a motorized X-Y translation stage that allows scanning across the separation bed width, at various locations along its length (Equipment and Data Acquisition section, p. 2860). This, coupled with the suggestion of

RAYMOND for a fraction collector (second paragraph, Silicon Devices section, p. 2860) would have made it obvious to a skilled artisan to utilize the detection unit to detect migration of separated components through any or all of the outlet channels because ideally the separated components will reside in a particular outlet channel of the fraction collector.

(10) Response to Argument

As to independent claims 1, 39, and 68, the Applicant first argues that the field generator of OAKEY et al. is a component of an imaging system, and therefore is separate from the microfluidic devices. However, OAKEY teaches the field generator that provides the magnetic field is directly associated with the microfluidic system (Figure 3; paragraph [0065]). Therefore, the argument that the field generator is a component of an imaging system and is separate from the microfluidic device is not persuasive to make the claims non-obvious in light of the combined teachings of RAYMOND et al. in view of OAKEY et al. to describe an overall system.

Next, the Applicant argues that a skilled person would have had no conceivable reason to contemplate the implementation of the field generator of OAKEY et al. within a microfluidic device, such as the kind of Raymond et al. In response to applicant's argument that there is no teaching, suggestion, or

motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, it would have been obvious to one of ordinary skill in the art to modify the device as described by RAYMOND with the addition of the magnetic field unit as taught by OAKEY because it would allow use of surface charge to be observed for distinguishing a particular particle in a sample (OAKEY, paragraph [0047]). The result would be a device enhanced with the capability to observe the behavior based on the surface charge of a specific particle within a sample, so as to better characterize said specific particle. The teachings of RAYMOND, *per se*, do result in this ability, making it desirable to incorporate the field generator as taught by OAKEY.

Finally, the Applicant argues that were the field generator as taught by OAKEY et al. to be incorporated into the microfluidic device of RAYMOND et al. that the field generator would be required to induce a field transversely across the separation bed, parallel to the separation bed and not substantially orthogonal to the planar separation bed. However, OAKEY shows the field generator (92, Figure 3) situated below the plane in which the microchannels are

situated (44, Figure 3), which makes the field substantially orthogonal to the planar region of the separation member. Additionally, OAKEY demonstrates that such a configuration will cause lateral movement of particles within the separation bed (130, Figures 5A-C; 156, Figures 6A-C; Figures 7A-C), which requires a magnetic field that is orthogonal to the flow direction of the separation medium. The flow of the particles transversely across the separation bead is not due to the magnetic field, but caused by the flow of fluid (OAKEY, [0057]). It is also noted that the placement of the field generator, used to generate the magnetic field as disclosed by OAKEY, is place substantially in the same relation to the flow channel(s) as is disclosed in the instant application by the Applicant (OAKEY, Figure 3, microfluidic flow device 44 and field generator 92, as compared with instant application, Figures 2 and 4, separation medium inlet channels 9 and magnet 31).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/J. CHRISTOPHER BALL/

Examiner, Art Unit 1759

09/19/2011

Conferees:

/Jeffrey T Barton/

Supervisory Patent Examiner, Art Unit 1759

09/21/2011

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